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CONTENTS

The Conception of Derivation in Epistemology: RAPHAEL DEMOS 5

The Universe of Light: FREDERICK J. E. WOODBRIDGE 15

Book Reviews 21

WILLIAM A. HEIDEL, *The Heroic Age of Science.*
ANDRÉ BREMOND, *Le Dilemme Aristotélicien.*
ARTHUR C. MCGIFFERT, *A History of Christian Thought.*
C. D. BROAD, *Examination of McTaggart's Philosophy.*
HANS DRIESCH, *Philosophische Gegenwartsfragen.*
KARL VOGTHERR, *Das Problem der Gleichzeitigkeit.*
CHARLES LALO, *L'Expression de la Vie dans l'Art.*
UGO SPIRITO, *Scienza e Filosofia.*
JOSEPH GEYSER, *Das Gesetz der Ursache.*
WILLIAM E. HOCKING, *The Spirit of World Politics.*

Journals and New Books 27

Notes and News 28

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THE JOURNAL OF PHILOSOPHY

THE CONCEPTION OF DERIVATION IN EPISTEMOLOGY

IN this article I propose to make certain distinctions in the notion of derivation as applied to knowledge. The traditional employment of this notion has been confused, and though the points I will make are rather elementary, they are perhaps useful, at any rate for the beginner in the field.

When, in studying the philosophical classics, we come upon discussions whether ideas are innate, or *a priori*, or derived from experience, or based on authority, or received from inspiration—all of which are discussions concerning derivation—we find that at least three possible meanings may be covered by these terms. In the first place, derivation may mean the *logical basis* of a belief, as when we ask if a proposition is *a priori* or not; this is a question concerning the *grounds* upon which a belief may be accepted, and more specifically, whether these grounds are intrinsic or extrinsic. I will call this "logical derivation." In the second place, we may be referring to the biological origin of an idea;[1] we may be asking ourselves: is this idea native to the mind or not, is it innate or acquired? We are not debating the logical justification of a belief, e.g., whether it is self-evident or not; we are asking, is man born with this belief or does he somehow get it during his lifetime? In brief, this is a question whether an idea is intrinsic to the individual or not. And I will distinguish this sense by calling it "biological derivation." And in the third place, by derivation we may mean *mental causation.* In asking whence a certain conception was acquired we may mean what suggested it to the mind, what brought it forward, what persuaded us to adopt it, whether it was emotion, or prejudice, or reason, etc. These are questions as to the psychological mechanism through which an idea happens in on the mind or is adopted by it. The question about a given idea would be whether it is derived or underived, whether it has a verifiable cause in consciousness or whether it has appeared on the scene quite unheralded, as though by a flash. And this use of the term I will call "psychological derivation."

In sum, we have three pairs of opposites, each defined by ref-

[1] I am using the term "idea" to designate conceptions and beliefs indifferently.

erence to primitiveness: self-evidence as against inferential truth; innateness as against ideas which we acquire; simplicity as against complexity in the psychological sense. I should like to insist that the three phrases—logical, biological, and psychological derivation—do not signify mutually exclusive species of one and the same genus, but express three different standpoints from which the question of derivation has been approached. In their consequences, these may overlap; at the same time, as they are distinct, there is no reason why an idea which is primitive from one standpoint need be primitive from either of the other two. Roughly speaking, the first phrase signifies the "ground" of an idea, the second the "origin," and the third the "cause." Yet in the history of thought, the three meanings have been jumbled together, especially the first with the second. Thus, the phrase *"a priori"* has been employed to mean both logically primitive (self-evident) and biologically primitive or innate. But self-evidence has to do with the validity of a belief whereas innateness has to do with how a belief comes to be lodged in the mind. The two things are different and different terms should be used. There is somewhat greater kinship between biological and psychological derivation, as both concern origination, yet it is obvious that they are distinct. E.g., an innate—and hence biologically primitive—idea would nevertheless be derived in the psychological sense, because it would require the aid of experience for its evocation into consciousness.

Logical Derivation.—This problem belongs to the theory of knowledge *par excellence*, and has been investigated most extensively; I will therefore dwell very briefly upon it. Logical derivation signifies the relation of a belief to the source of its validity; this may lie either in the belief itself—in which case the belief is self-derived or logically primitive—or wholly outside the belief, and then it is a logically dependent belief. In the latter event, we have two alternatives: a belief may derive its validity either from another belief—as happens with beliefs whose truth can be proved by inference—or it may be grounded upon immediate experience, as with perceptual beliefs. A third possibility is for a belief to be based on authority; for authority, too, is an instance of logical derivation. The propositions about the past life of the human race derive their evidence from the statements of historians, and this is the evidence of authority. Thus, the view that Athens was ravaged by a plague during the Peloponnesian War is based upon the History of Thucydides. So again the statement of an expert is a valid basis for belief; when I accept the diagnosis of a doctor, my belief may be said to be rationally grounded, for though I do not know enough to judge his particular verdict, I know enough

to judge, in a general way, whether the man is an expert or not. In judgments based upon authority—and these perhaps constitute the majority of judgments—there is presupposed an ultimate premise of social credibility—namely, that people don't lie; this premise is the basis of the attitude of trust without which no social life is possible.

We should distinguish between authority in the logical sense and in the psychological sense. The first is a type of evidence, the second is a form of force operating upon the mind, and properly comes under what we have called psychological derivation. An example of the latter is when a man's ideas are due to suggestion or custom or tradition.

Beliefs which are logically primitive are known as *"a priori"*; they provide their own evidence; like Melchisedek, they have no parents, or rather, they are their own intellectual parents. The contrast between primitive and dependent beliefs may be expressed by the statement that whereas the former are internally related to their evidence, the latter are externally related to it. Are there any *a priori* beliefs? According to philosophical tradition (Plato, Descartes, Kant) there are; for example, the principles of logic, of mathematics, and science. In the realm of concepts, Plato held that our abstract ideas are *a priori* and that the relevance of experience was of a psychological character. For Kant, the categories were logically primitive. Are these principles and notions truly primitive in the logical sense? The reader must be familiar with the strong dissent expressed from the empiricist camp; in addition, mathematical logic has recently shown that mathematical principles hitherto regarded as self-evident, like the axiom of parallels, are only suppositions which can be replaced by their opposites. When all is said and done, the attack of the modern mathematical school leaves the question of primitiveness, of a priority, where it was. The point made concerning logical and mathematical propositions is that they are postulates rather than certainties, necessities of thought rather than descriptions of objective truth. But to take them as hypotheses is still to view them as anticipatory of concrete experience; to regard them as definitions useful in the ordering of the material of knowledge is still to consider them as primary attitudes, underived from the material itself. What has happened really is that the conception of logical validity has been replaced by an alternative conception, that of epistemic validity, i.e., validity from the standpoint of cognition rather than from that of objective truth. Consequently, to the various types of derivation presented in this paper, this last one of epistemic validity might be usefully added. The whole question is too important

to be discussed in an incidental fashion; and in this article we are limiting ourselves to the attempt of making issues clear without trying to settle them.

Psychological Derivation.—Psychological derivation concerns the material and efficient causes (in Aristotle's sense) of the idea. The distinction between logical and psychological derivation can be easily illustrated. In the course of a judicial investigation in which the author of a murder is being sought, the police come across a *clue* which enables them to lay their hands on the *evidence:* the evidence is the logical ground, the clue is the psychological cause. In the schoolroom, the teacher of mathematics uses concrete examples in order to make the proofs understood by the student. The examples are a psychological aid for the comprehension of the logical basis. The psychological cause brings about a belief either by suggesting a possibility (as in the case of a clue) or by helping to persuade us to the belief (as in the case of the example). In the field of conceptual apprehension, the psychological factor enters in the shape of imagery, symbolism, and language. Empiricism, if interpreted as a doctrine of the logical derivation of ideas from experience, is open to doubt, but taken as the theory of the psychological origination of ideas from sensation, is probably true. The mind proceeds from the concrete to the abstract; sensation is psychologically prior to thought. The more abstract the idea, the more concrete the symbol it demands. There is a certain contrast between the two orders of logical and of psychological derivation respectively: among propositions, the ones that are logically primitive are those that in the order of knowledge we reach last; conversely we begin with those which are the most complex and involve the greatest number of ancestors. Thus, there seems to exist a law of inverse proportion whereby the more independent a belief in the logical order, the more derived it is in the psychological order, and *vice versa.*

Psychological primitiveness is exemplified in that most important of mental faculties, the imagination, by which ideas appear without any conscious suggestion, as though self-caused. Genius in the field of knowledge is imaginative insight into new theories and conceptions. But ideas must not only be born; they must be baptized before they are admitted into the epistemological community; and intellect is the priest who performs the rite, testing and validating them. In this matter, people have often mistaken psychological for logical primitiveness: a man inspired is liable to take his inspirations as self-evident. Inspiration provides only a possibility, never a certificate of truth; the psychological convincingness of an idea expresses its causal force and is no measure of

its truth-value. Knowledge grows only by a wise harnessing of the imaginative to the logical faculty.

The practical problem arises of how to avoid confusing psychological with logical primitiveness; what are the signs by which to know the one from the other? In fact, there are no certain rules by which to distinguish the perception of truth-value from psychological convincingness; however, time sifts the one from the other; further, the coherence of the new idea with already validated ideas is a useful test.

The inquiry into psychological derivation can be so enlarged as to include the entire field of the mechanism of knowledge. Such an inquiry would be an attempt to answer the question: what is the actual operation of the mind in its cognitive character, and it would consider not how we *should* think, but how we *do* think. The German school have very properly insisted that the psychological approach should be clearly distinguished from the epistemological inquiry; but while agreeing to the distinction we should refrain from inferring that the psychological approach is any the less important for that, or one which the philosopher can afford to neglect. Truth is a value and philosophy is a search for it; philosophy is an art as well as a science—a practical as well as a theoretical activity. And the more the philosopher familiarizes himself with the mechanism of thinking, the better a master he becomes of his instrument, and the greater his hopes of attaining his purpose, which is the apprehension of the truth and the persuading of others of the truth. Nor can strict epistemology completely disinterest itself in this matter. In the main, the problem of the actual mechanism of belief lies outside the territory of epistemological theory, but there is a part in which the two fields overlap. The psychological field involves the question of how we, as we now are and our minds are made, go about in selecting our beliefs. Now, should the actual mechanism of persuasion be faulty by any chance, should intellect be so constructed as to have no necessary connection of any sort with truth, then all our reasonings, all our beliefs, all our philosophies would be wrong, or at least would lack the guarantee of validity. There is what Royce would call a reflective argument here: in some ultimate sense, our actual procedure of belief must be right; otherwise all thought and assertion would be without validity, including the very assertion that the procedure of belief is faulty. We thus have the axiomatic proposition that our mechanism of belief, in its barest and most basic aspect, must lead to the apprehension of truth. To this extent, validity and fact are interdependent, and the epistemological and the psychological inquiries overlap.

The classical philosophers, from Socrates to Spinoza, have depicted the mind as an instrument dominated by the logical factor; further, they have supposed the dominion of reason to extend outside the confines of its house proper, over the whole personality, over feelings and actions as well as over beliefs. To know is to do. One of the most striking reversals in the history of thought is the change which has taken place in recent times in man's attitude toward the power of reason in thought and life. Freud is the leader of the school which utterly denies that reason has any control over desire. The human chariot is driven by impulse and feeling, and reason is a feeble animal tied behind and following meekly. Reason lacks control not only over the emotions, but over its own proper sphere of belief. Parallel with the Freudian doctrine is the view which regards ideas and beliefs as reflections of geographical and economic circumstances, and of class-feelings. This is the doctrine of thought as swayed by the accidents of time and space. Today, the emphasis is on the impotence of reason; our ancestors celebrated the glories of the power of reason. Surely both the classical and the modern views are exaggerated. Mind had been represented in the past as an abstract, formal, impersonal being, beyond the limitations of actuality; and when we realized later that mind was entangled in the web of circumstance and desire, then, by a sort of romantic disillusionment, we went over to the opposite view that mind is not rational at all. If mind is a universal—Aristotle's form of forms—then, it is a universal embedded in a particular, which is the individual person belonging to a certain time and place. Thought is a temporal process, or at any rate, has a vivid temporal aspect, and so is exposed to all the hazards of time and fortune. Mind gazes at reality from an individual perspective, determined not only by one's sensory limitations, but by one's previous beliefs and one's interests. But to say that the universal is embodied in the particular is not to divest it of its character of universality; to say that the mind has a concrete determination is not to deny rationality to it—it is only to indicate how that rational character is canalized and made operative. The special circumstance and the particular perspective are not ending-points, but starting-points for the quest of truth. Of course, the union of the universal and the particular is not achieved in a simple manner; the two are in a state of constant tension and consequently there is the risk that the personal, circumstantial element may distort or confine the mind. When this happens—and it often does, since mind is exposed to disease in the same way as any other living being—we have the phenomena on which the Freudian school dwell.

Biological Derivation.—We are all familiar with the contrast of innate vs. acquired ideas, but the following distinctions will help make the conception clearer. To say that a belief is acquired does not mean that it comes from experience of the physical world; it may be derived from introspection. More generally, an idea is not acquired in the sense that it comes from "outside," nor is an idea innate in the sense that it comes from "within." To suppose this, would be to work on a naïve picture of the mind as a self-contained bit of substance with its own "inside" and to which reality is "external." Now, it is not necessary to assume such a view in order to define the notion of biological derivation. Much more probable is the view that the mind is organically related to its environment; if so, the mind exists outside, among the world, and the world is inside, within the mind. In short, the separation of the world from the mind which a definition of experience as the contact of mind with an external world would presuppose, is improbable and quite gratuitous for our purposes.

We will thus limit ourselves to the assertion than an idea is innate in the sense that it is intrinsic to human nature, part of man's natural equipment, whereas an acquired idea is part of human history. The contrast of innate and acquired is one between *nature* and *habit*. But here again we must refrain from assuming more than is necessary. (*a*) Innate knowledge is necessarily neither inherited experience as Spencer held nor (*b*) due to experience by the same individual in a previous supramundane life, as Plato held. The question as to how ideas come to be innate does not belong to this stage of inquiry. (*c*) By defining an innate idea as one which is part of human nature, we have expressly refrained from identifying it with the structure either of the mind or of the body as such. It may be innate mentally, or physiologically. (*d*) Is an idea innate in the sense that it belongs to a metaphysical timeless being like Kant's unity of apperception or Aristotle's active intellect? Again, we neither affirm nor deny. The human nature of which ideas may be an intrinsic part need not be further defined, whether naturalistically, or from the standpoint of an absolutist. Our phrase "biological derivation" is rather misleading because the term "biological" has naturalistic connotations, to which we have no intention of committing ourselves.

Further, all suggestions of superior validity should be eliminated from the idea of biological primitiveness. Discussions in the past seemed to imply that a conception which was innate to the soul was endowed with exceptional authority, because the soul was noble; but if an idea came from experience, its credentials were suspect because matter was ignoble. This intellectual snobbish-

ness, which measured the value of an idea by its aristocratic parentage, must give place to a more democratic impartiality that sets all ideas on an equal level, whatever their origin. The same facts have also been used to prove the opposite result; thus, it has been maintained that an innate idea, representing as it does the structure or laws of the mind, lacks objective reference; but an empirical idea corresponds to reality. Actually, there is no reason why an idea may not be both subjective and objective, expressing the laws both of the mind and of reality; to use Leibniz's phrase, there may be a pre-established harmony between mind and reality.

At this stage of our discussion, there should be no difficulty in seeing that the lumping together, during the history of thought, of innate with *a priori* ideas, is misleading. A belief is innate in the sense that it belongs to the nature of man; a belief is *a priori* in the sense that it is its own logical ground. The first specifies an internal relationship of idea to human nature; the second an internal relationship of ideas to its evidence. Given that the relations are different, the question may still be raised: may they not be connected, may not the self-evident idea be also the unlearnt idea? Plato and Descartes have replied affirmatively. I will now consider some of their arguments and try to show that they are inconclusive.

(*a*) *Considerations arising from the nature of the object.* The argument is as follows: ideas can be acquired by the mind only through experience; but abstract ideas—already granted to be *a priori*—are not obtained from experience, and therefore they must be innate. We may admit without argument that abstract propositions are not obtained from concrete experience; from this, however, it does not follow that they are not derived from any experience whatever. In addition to concrete experience there is conceivable such a thing as ideal experience. We perceive chairs and tables; also we perceive universals and general laws. The field of presentation includes essences as well as particulars. If so, whenever the mind convinces itself of the truth of an abstract proposition from an analysis of its constituent conceptions, it does so by means of experience, not sensory but rational. The abstract belief is acquired, not innate. Only the nominalist, construing the world as a collection of particulars, might deny the possibility of rational perception; but surely the apriorist school is not nominalistic. Consider Plato, for example, in whose view the laws of physics, mathematics, and logic are just as real as chairs and tables, in fact more so; the formal pattern of the world is *there* just as much as its concrete detail. And yet in the well-known discussion in the Meno, he argues for innateness for reasons which run counter

to his realistic views. The little slave-boy is questioned about mathematical truths which he had not been taught before; as soon as their meaning is made clear to him, he assents to their truth. And this is used by Plato to demonstrate that the slave-boy somehow knew these truths already. But surely a simpler explanation of the matter is possible: namely, that the slave-boy while understanding the meaning of the mathematical propositions was, so far forth, engaged in an act of perception—the perception of mathematical truth, and therefore was reaching his beliefs by the route of experience. Plato and apriorists in general seem astonished by the fact that the mind assents *immediately* to an abstract truth, once it has grasped its purport. Now, the instantaneity of assent is not peculiar to the acceptance of abstract propositions; it is a characteristic of all knowledge based upon experience, concrete as well as formal; thus, as soon as I perceive that the clock is on the mantelpiece I assent to the proposition that the clock is on the mantelpiece.

(*b*) *Considerations arising from the nature of the cognitive subject.* In fact, Plato is led to espouse innatism from metaphysical considerations; he holds that the soul is incapable of apprehending universals while encumbered with the body; therefore such knowledge of essence as it possesses is a previous acquisition, obtained during an existence in which the soul was free from sense. There are so many varied implications of a religious and metaphysical nature in Plato's doctrine that we can not possibly do justice to it in this article. Confining ourselves to the specific point, we will say this only: we know universals in this life to the extent that we do know them, and if, as is alleged, the body prevents us from getting a clear view of essences, why then, we do not possess a clear view of them. In other words, the actual extent of our knowledge of universals is explicable on the basis of whatever experience we have of universals now, as shadowed forth in particulars.

(*c*) *Considerations arising from the nature of knowledge.* Another argument against the possibility of ideal experience has been the following: the datum of abstract knowledge is non-temporal, therefore the knowing of it is non-temporal. Thus, it is inferred, there can be no such thing as an experiencing of universals, and abstract ideas must be innate. This argument is based on a confusion of cognition with its object; the datum could quite well be of one character and the knowing of it of another.

The above three points may be summed up in the phrase that the traditional apriorist school has worked on an inadequate conception of experience, wrongly supposing that one who is not observing a particular is not observing at all.

(*d*) *Considerations arising from the nature of the ideas.* The considerations that follow are of a more fundamental type than the ones already studied. The position now is that abstract ideas—at least some of them—could not in the nature of the case arise from experience, abstract or concrete, because they are presupposed in any situation of experience. Cognition proceeds on the basis of a certain method and certain criteria; these criteria have not been the result of discovery, for the simple reason that they constitute the tests for all valid discovery; the cognitive method has not been derived from observation, since it is implied in any valid observation. Categories are intrinsic to reason, and hence not data *for* reason. In reply, we would suggest that even though categories were intrinsic to reason, reason itself might be an acquisition. Granted that the categories do not have experience as their source, still it is possible for them to be acquired in some other way. Let us consider some alternatives. (1) One alternative is that reason with its schematism and its categories may be primarily of a social origin. Durkheim holds that the individual as such is not a rational being, but that he acquires a mind to the extent that he is identified with the community. Language is the basic embodiment of the social mind; and as the child acquires it, gradually it assimilates the pattern of concepts and criteria, and thus becomes a rational being. This doctrine, however, merely transfers the problem from the field of the individual mind to that of the social mind. The question still remains: how did the categories make their appearance within the social mind?

(2) Another alternative is that thought, knowledge, reason, with all their presuppositions, are historical emergents, achievements, whether individual or social; that the categories are evolutionary products, experimental hypotheses forged out in the active contact and conflict of man with his environment. Mentality itself belongs to history. (Of course, at this point, the opposition between nature and habit, in the biological field, breaks down).

We have traveled a considerable way in order to demonstrate that innateness and apriority need not go together. And indeed the whole problem arises from the confusion of the two conceptions of logical as opposed to biological derivation. Once it is realized that *a priori* and innate do not mean the same thing, it is evident that an idea may be independent of experience in the logical sense, and still be learnt, that is, obtained through the route of experience, in the biological sense.

RAPHAEL DEMOS.

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THE UNIVERSE OF LIGHT[1]

SIR WILLIAM BRAGG has given to a book on optics a brilliant title, *The Universe of Light*.[2] The opening sentences of the first chapter are these: "Light brings us the news of the Universe. Coming to us from the sun and the stars it tells us of their existence, their positions, their movements, their constitutions and many other matters of interest. Coming to us from objects that surround us more nearly it enables us to see our way about the world: we enjoy the forms and colours that it reveals to us, we use it in the exchange of information and thought." The reader's attention is then called to the rightful and reasonable extension of the meaning of the word "light" to cover the wide range of invisible radiations, the great conveyor of energy from place to place, radio transmission, Röntgen rays, rays from radio-active substances, and, possibly, cosmic rays. "These greatly differing phenomena are all manifestations of one principle, the magnificent inclusiveness of which has grown clearer continuously as we have studied the nature of light. . . . Even the atoms themselves seem to fall, in certain aspects, within the same great category. Light, therefore, using the full meaning of the word, transmits energy which is the mainstay of life, and gives to living beings the power of observation: and it is akin to the matter of which all things animate and inanimate are made. The universe is its sphere of action. We do it no more than justice when we speak of the Universe of Light."

Clearly we do it no less, if light is a principle of such magnificent inclusiveness. After reading the book, however, I am prompted to ask whether it should be read in the light of the title or the title read in the light of the book? What is it that has been illuminated and made clearer and more understandable, the universe or the messenger that brings us the news of it? Is the book about the messenger or does it contain his message, in part, at least? If the latter, what then is the universe like? The book leads me to ask these questions, and not this book alone, but books on light generally. Sir William's book, by its suggestiveness and his competence, has made them more interesting than ever. I do it and him, I hope, no injustice by using it as a text for comment.

This particular book is chiefly about the messenger's way of travelling. It is essentially an introduction to optics for the general reader and is a revision and enlargement of the Christmas Lectures of 1931, given at the Royal Institution by the author, under the same title. "I have taken as the thread of my story," Sir Wil-

[1] Read at the meeting of the Eastern Branch of the American Philosophical Association, Amherst College, December, 1933.

[2] New York: Macmillan Company, 1933, pp. xi + 283.

liam writes in the Preface, "that old rivalry between two theories of light which has been one of the most powerful contributions to the development of science. The corpuscle and the wave, associated always with the names, respectively, of Newton and Huygens, have each in turn seemed to be finally victorious. The struggle is ending in a manner as unexpected as it is illuminating. There is to be a reconcilement of hypotheses which we had thought to be mutually exclusive; and the fact warns us of the danger of allowing our mental imaginings to become fixed beliefs. We still find it difficult to understand how these two theories can both be true; yet we are forced to do so by the mass of good evidence which can be brought forward in support of each of them. We conclude that what at one time may be beyond our understanding may later become clear, not only through the acquisition of fresh knowledge, but also by the training of our minds to new ways of thought."

A theory of the way a messenger travels may have little to do with the news he brings. The radio brings us news from the ends of the earth, but a theory of radio transmission would hardly be that news. There is considerable difference between the way a messenger goes from one place to another and the message he brings. This seems to be conspicuously true in the case of light. Whether it travels by way of wave or corpuscle or by way of both together, its message, at least for those who see, is that the visible world is the chief object and source of all their knowledge. In this world light and darkness alternate, and it is easy to think of light travelling in it and dispelling the darkness, although, since Aristotle, we have been repeatedly cautioned about thinking so. Professor Bridgman has said that "light as a thing travelling must be recognized as a pure invention."[3] Yet it is natural to think of light as travelling, for lamps, when lit, seem so evidently to send out their light, mirrors reflect it, prisms refract it, and lenses focus it. The lantern to our feet carries its horizon of illumination along as we walk. Shadows fall. There are opaque bodies through which light does not seem to pass. Something that travels, although we never see the traveller, is a conception of light difficult to avoid when we consider the behavior of a lighted world. It is, however, the conception of something not identified. The distinction between what we ordinarily call light and darkness is like the distinction between day and night, one which does not reveal an agent which makes the difference, unless the agent be something like the sun or other glowing or radiant bodies. They are not the light of theory. We are consequently forced, in dealing with light as something that travels, to deal with it indirectly, not with it itself, but with its manner of travel-

[3] *The Logic of Modern Physics*, p. 153. N. Y.: Macmillan Co., 1927.

ling. Does it travel like a projectile or like a wave? Hence the rival theories and the current attempt to reconcile them. This is the story the book tells.

One can not read the story, even in the condensed form in which Sir William relates it, without being profoundly impressed by the brilliancy and skill shown by those who have contributed to it. Here is one of the masterpieces of modern physics. Can I be pardoned the apparently impudent question, What is it all about? I intend no impudence. I was once content with the answer that it is all about light, but am no longer content, and the more I read, the less content I am. My admiration for the intellectual skill which has marked the development of the theory and the remarkable experimental verification of deductions from it, is greater than it was when I took my first lessons in it years ago. I do not put such matters in question. What I have seen done before my eyes and read in books written by responsible men is too evident to be gainsaid. It is the success of the theory which baffles me—the success attained by dealing with modes of travel without an identifiable traveller. A projectile that flies through the air like a bullet from a gun, the movement of waves in a pan of water, the impact upon balls in series, and all the many means, aided by mathematical calculations, which are used in building up the theory, make clearer and clearer modes of travel, but obscurer and obscurer the traveller itself. My knowledge of corpuscular and wave propagation increases, but as knowledge of light, it is like knowledge of a light that never was on sea or land. The Light, the light that warrants our speaking of the Universe of Light, although it remains unidentified as corpuscle or wave or both somehow together, is that which reveals that there is a visible world accessible to observation and experiment. Its actuality is declared by the alternation of day and night and by opening and closing the eyes. It is that which brings us news of the universe.

If the news, or part of it, is optics, what then is the universe? The answer seems to me to be this: it is something whose framework, when we attempt to model or conceive it, is modeled and conceived in an optical way. In other words, if optics is news, then models, maps, plans, patterns, designs, systems, or conceptions of what the universe is like, as containing all that is, are bound to be of a sort which an observer might possibly see. Otherwise considerations of shape, size, distance, position, motion, orbit, and the like seem to lose meaning. Space seems to disappear. If it is characteristic of the universe that the angle of incidence equals the angle of reflection, the model must be congruent with that principle. If we consider whether the universe is contracting or expanding, whether it is lim-

ited or unlimited, it is an optical model which gives point to the consideration. In short, if optics is valid news, then models and conceptions of the universe are formed in terms of an optical system. The universe, whatever else it may be, is optical.

The acceptance of this conclusion raises many interesting questions. I would mention a few of them. One of them is the sort of question Professor Royce dealt with in his *World and the Individual.* I ask it with reference to the conclusion just reached. What is to be said of a system or universe which is delineated and conceived in an optical way? Any answer to this question seems to me to be, in principle, like Professor Royce's answer, irrespective of the particular use he made of it. Modeling and conceiving such a system in optical terms are themselves determinations or delineations of what such a system is. This strikes me as both obvious and profound. It is obvious that optical systems are thought of in optical terms, angles in terms of angles, distances in terms of distance, positions in terms of position, and so on. The repetitions and correspondences which are therein involved, make it impossible, however, to limit and frame the system itself in terms of angles, distances, positions, and so on. Such terms are limited in their application in such a way that they are not applicable to the system itself. This is, perhaps, profound. We are dealing with a system which, if delineated at all, must be delineated in terms of optical models which its character imposes, but which are not replicas of that character. These models can not be placed side by side with the system and then compared. They serve in exploring the system, but they do not embrace it. This does not mean that the system is so vast that no model can embrace it, nor that it is greater than any conceivable model. It means rather that optical frameworks are in the system, but the system is not in any framework at all. Space is in it, but it is not in space.

From this conclusion, another seems to follow, namely, that there can be in the universe no uniquely privileged observer, no observer, that is, who can compare what he observes with the universe itself. Although light brings us the news, it does not send it. The difference is considerable. The acknowledged and evident effect of its coming is its message and that message is not about a transmitting station which we might occupy and then observe whether the message received was the one intended to be sent. Optics forbids such a privileged station. Why, then, I would rhetorically ask, attempt to construe the universe as if there were a uniquely privileged observer somewhere? If there is no such observer, why suppose that optical perspectives are anything else than necessities of an optical system? Why imagine that the intellectual extension of the terms

of delineation like straight line, angle, rotation, etc., reveals what such an observer would see if there were one? Why suppose that the universe can be spatial without at the same time being optically instrumented? I leave the questions in their rhetorical form. If optics is news that the universe is optical, it seems to me to be quite superfluous to try to get back of the news and find an observer who can tell us whether the news is correct. It seems futile to ask what the news would be for an observer independent of the types of the optical behavior of an optical world.

Taking optics, then, to be news of the universe, I would venture to amend one of the sentences quoted from Sir William Bragg's book. Speaking of light he says: "The universe is its sphere of action." I would say: Its sphere of action is the universe. Light acts; then the universe is a sphere whose center is anywhere and whose circumference is nowhere. Hence space as optically determined, hence the inevitability of optical models and frameworks without an embracing framework, and hence the absence of a uniquely privileged observer.

Light brings us other news besides that of a universe optically instrumented or schematized. "Coming to us from the sun and the stars, it tells us of their existence, their movements, their constitutions and many other matters of interest." It lights up the universe, makes it visible at least in part, revealing that there are sun and stars in the sky, and minerals, plants, and animals on the earth. Perhaps this kind of news is not the more important, but it is certainly the kind which most absorbs our attention. It is a dramatic kind of news, as if light were exhibiting what it can do to waves and corpuscles by illuminating modes of travel. Then there is splendor and scenery to behold and the drama of life and death. One ought not to expect to find this vision in a book on optics, but books on optics rarely fail to mention it. Vision is too evidently the major consequence of letting light be. Without this consequence we should never speak of a universe of light or of getting news of the sun's existence; books on optics would never be written. The books do vision no more than justice by making at least a bow.

What this particular book says about vision, I have found perplexing and exciting. It says the usual thing, but not in the usual way. The usual thing is that there is a device in the eye "which gathers together the waves coming from each and every external point, and converges them upon a corresponding point on the retina. Thus all the details of the view are impressed upon the retina in their proper places relative to one another, and each with its proper character. The whole is then referred to the brain by way of a complicated system of nerves, and is there interpreted"

(p. 38). If this were all, it would be the usual thing, leaving the question open whether the "interpretation" is vision. But light as a newsbringer is constantly stressed and stressed in such a way that I can not regard the expression as a pretty metaphor. "When light enters the eye it brings news of the source from which it has come, and of its experiences on the way. In particular it tells of the last encounter with a material object before entry into the eye, and so enables the owner of the eye to 'see' that object" (p. 38). Such expressions make it hard for me to identify vision with an interpretation in the brain. I can think of light as informing the brain that there is a sun in the sky, but I find it difficult to think of the brain as seeing a sun in the sky. And I should find it just as difficult if I substituted for "brain," "mind" or "consciousness" or "soul."

I find this difficult because I must believe that eyes and not brains are the organs of seeing, just as ears and not brains are the organs of hearing. Consequently, to identify interpretation in the brain, or in the mind, with vision seems to me to be curiously unintelligible. I say, curiously unintelligible because such identification would involve either vision without eyes or the reversal of the process which generated the interpretation, going back to the retina, through the lens and ending with that last encounter of light with a material object before entry into the eye. In the latter case, it would seem as if the brain looked back over the course by which light had come to it, and looked back not with the eye, but through it. Newton [4] thought that God had vision without eyes and Molyneux [5] exclaimed: "He that made the eye shall see!" It is, perhaps, possible that a being having vision without eyes could make them, but he could hardly make them in order to see. That would be a little ridiculous. If, however, he lived in a world where eyes were necessary for vision, it would not be surprising if he invented a microscope. I can readily accept brains without a visible world, but I can not similarly accept eyes. And it is neither brains nor eyes that make the world visible, but the light itself. So far as I can make out, all that the brain does with the help of the eye is to coördinate our activities in an optical world made visible by the light. It is that world that is interpreted and not a nervous disturbance in the brain.

Accordingly, with little reservation and with possible misconstruction, I can repeat the words: "When light enters the eye it brings news of the source from which it has come, and of its experiences on the way. In particular it tells of the last encounter with a material object before entry into the eye, and so enables the

[4] *Optics*, Queries 28, 31.

[5] *Dioptrica Nova*, Part I, Prop. 28.

owner of the eye to 'see' that object." Yes: the man who has eyes and brain sees the visible world, but that world quite evidently is not in his eye, or in his brain, or in his "mind." It is in the light.

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BOOK REVIEWS

The Heroic Age of Science. WILLIAM ARTHUR HEIDEL. Baltimore: The Williams and Wilkins Co. 1933. vii + 203 pp. $2.50.

The title is taken from a sentence of Whewell: "The sages of early Greece form the heroic age of science"; and the purpose of the book is given more definitely in the subtitle: "The Conception, Ideals, and Methods of Science among the Ancient Greeks." It is not meant as history of science, but rather a description of the Greek understanding of science with examples.

The book opens with an essay of sixty pages on the "Conception and Ideals of Science among the Greeks," in which general features are treated, e.g., the distinction between *historia* and *mythos,* the relation of science to religion, and the contrast between law and nature. The second part, on "Methods," consists of an introductory chapter, then chapters on "Observation and Induction," "Classification," "Analogy," "Experimentation," and an "Epilogue."

The point of view is sane, the scholarship is more than adequate both historically and philosophically, and the style is clear and easy. The book can be recommended to those who are interested in the history of science, or of logic, or the history of philosophy in general.

R. S.

Le Dilemme Aristotélicien (Archives de Philosophie, Vol. X, Cahier II). ANDRÉ BREMOND, S.J. Paris: Gabriel Beauchesne et ses Fils. 1933. 155 pp.

The dilemma of Aristotle Père Bremond traces to "the desolating mystery of his antiplatonism." Having condemned the doctrine of Platonic Ideas because of a supposed dualism between them and the sensible world, Aristotle (so the interpretation runs) sought to establish a philosophy in which reality was conceived to be continuous from matter to pure actuality. But the Platonic Intelligibles are concealed under the name "actuality," and the unified Aristotelian reality is divided into a world, in which nature or "the soul of things" is the efficient mover, and pure Actuality, which is beyond the world. As consequence of this major dilemma

there are antinomies and aporiæ in all the doctrines of Aristotle's philosophy. In logic, in metaphysics, in physics, in psychology, in ethics, the same problem recurs in varying forms—how to reconcile the persistence of substance with universal change, ideas with things, the soul as active intellect with the soul as form of the body, a static syllogistic science with nature conceived as a continuity of living forms, God as pure actuality with the dynamic world of experience. Père Bremond brings considerable erudition to the task of reducing the antinomies of being, causality, and knowledge to a single dilemma, nor does his interpretation travel unsanctioned ways, for he can, and does, derive comfort from Jaeger and Taylor. It is interesting to observe consequently that, having shown there is no coherent Aristotelian system, he discovers (with Taylor) a synthesis, sometimes wrongly attributed to Aristotle, whose true name is Thomism. It is no reflection on this study of Aristotle that it should close with the shibboleth, "Oportet ut sint *Ideae!*", for it has been a long time since a work on Aristotle has appeared which does not betray Platonic tendencies and nostalgias. Père Bremond's study is in the modern mode of Aristotelian criticism which labors with an irony worthy of Plato, though perhaps unconscious, to treat the philosophy of this great critic of Plato by tracing in it the steps of a departure from Platonism; and that departure usually turns out to be, in the same degrees of progression, a departure from philosophic truth and vitality.

R. McK.

A History of Christian Thought. Volume I: Early and Eastern; from Jesus to John of Damascus. Volume II: The West; from Tertullian to Erasmus. ARTHUR CUSHMAN MCGIFFERT. New York: Charles Scribner's Sons. 1932, 1933. 352 and 420 pp.

These two volumes were the last work of the late Arthur Cushman McGiffert, the second of them appearing after his death. With his books on *The Apostolic Age, The Apostles Creed,* and his edition of Eusebius's *Church History,* and with his *Martin Luther, Protestant Thought before Kant,* and *The Rise of Modern Religious Ideas,* they constitute a history of the intellectual life of the Christian Church through its entire development.

McGiffert's genius at historical interpretation of currents of religious thought is conspicuously apparent in his treatment of the early period. He develops effectively a contrast between the mystical tradition that was expressed in diverse forms in Paul, John, Ignatius of Antioch, the gnostics and Marcion, and the legalistic tradition that is found in most of the so-called Apostolic Fathers, the Greek Apologists, and Irenaeus. In the former tradition "Chris-

tianity appeared under the guise of a mystery-religion, in which salvation is secured by union with a dying and risen Lord." In the latter "it appeared rather as a moral system based on divine sanctions," as a law of liberty that had superseded the Jewish law and eliminated racial and local features so as to become a universal law for mankind.

Particularly brilliant also is McGiffert's treatment of the trinitarian and christological controversies of the fourth and fifth centuries. Intellectual developments in this "critical period in the history of the church" were not much affected, in McGiffert's judgment, by political institutions or events or by the immense contemporary changes in the status of the church in the empire. Through these controversies there constantly went a clash between ideas of divine transcendence stated in terms borrowed from Platonism and divine immanence stated in terms taken over from Stoicism. The credal formulae of the great councils, as of Nicaea and Chalcedon, reveal a victory of the Platonic ideas: indeed McGiffert goes so far as to say that if the Stoic metaphysics had been dominant a doctrine of the Trinity would not have been necessary to save the values which Christians cherished.

Among the best chapters in later sections are those on Irenaeus, Tertullian, Cyprian, and especially Augustine. The medieval period is covered by chapters on Eriugena, Anselm, Abelard, Thomas, Duns Scotus, William of Ockham, and others, and in these chapters, much more than in most histories of philosophy, the integral character of the philosophical and theological thinking of the time is portrayed.

S. P. L.

Examination of McTaggart's Philosophy. Vol. I. C. D. Broad. Cambridge: The University Press. 1933. lv + 460 pp.

This very able analysis of Volume I of *The Nature of Existence* will interest students of philosophy on at least three counts. (1) As an "examination" of McTaggart's metaphysics it is, of course, the best work that has appeared or is likely to appear on the subject. The analysis is lucid, detailed, scrupulously exact, and it offers as useful aids to the reader an analytic table of contents some 40 pages in length, a "retrospect" which summarizes in 86 "steps" the course of the argument and criticism, and an index from which Dr. Broad's characteristic humor is not absent. If the exposition of some of McTaggart's demonstrations assumes at times the character of an exposé, the fault is not the critic's and the judgment finally passed on this variety of philosophic "absolutism" seems eminently just. (2) At several points in the argument Dr. Broad

has included contributions of his own to such topics as the status of propositions, the nature of definition, what implication means at Cambridge and elsewhere, and the possibility that Absolute Processes may be the only particulars. His discussions are invariably enlightening in so far as they deal with the discrimination of possible meanings and the statement of alternative positions on points at issue. His constructive suggestions are ingenious and frequently plausible. (3) In his treatment of Stout and Bradley, and even of Hegel and Bosanquet, Dr. Broad displays a willingness and an ability, unusual at Cambridge, to find intelligible meaning in doctrines not formulated in the Cambridge manner. The catholicity thus manifest seems distinctly worthy of emulation.

A. E. M.

Philosophische Gegenwartsfragen. HANS DRIESCH. Leipzig: Verlag E. Reinicke. 1933. 184 pp.

Driesch here collects a number of glosses written during the last three years on problems raised in phenomenology, logical positivism, *Ganzheitstheorie,* and the theory of physical indeterminacy. The book is in no sense an introduction to these problems, nor to the author's systematic views, but presumes an acquaintance with both. Driesch is dressing the lines of his system, and reminds us: that he distinguishes carefully between immanent intuition of types of order, empirical experience, and metaphysical hypothesis, which the newer phenomenologists fail to do; and that he is a better positivist than those of the Wiener-Kreis, because he is less prejudiced in favor of mathematical-physical conceptions.

Instead of regarding *Ganzheit* and causality as alternative principles of explanation, as do some, Driesch insists on the recognition of special types of *Ganzheitkausalität.* In this connection he says that the cells of living organisms, besides being governed by entelechies, may also be in "understanding" communication (*Verständigung*) with each other by normal processes such as we discover only in the abnormal cases of telepathy and the like. This possibility, he says, he has not put forward previously.

A new venture also is his argument that the Heisenberg indeterminacy can not mean "real freedom" of the electrons, because that would make impossible even the frequency calculations.

H. L. F.

Das Problem der Gleichzeitigkeit. KARL VOGTHERR. München: Ernst Reinhardt. 1933. 195 pp. RM. 5.50.

This book is an attack on the restricted and general theory of relativity, and especially on the former, by means of an analysis of

simultaneity. Its author claims not only to establish an adequate definition and criteria of absolute simultaneity, but to show that its relativization is impossible. Vogtherr first establishes the principles of pure geometry, chronometry, and kinematics, and then applies these to develop the "only possible" physics, in which the "conventions" so characteristic of modern theories have no place. The argument rests upon essentially Kantian bases, with a coloration borrowed from Driesch: the principles of geometry and kinematics are either axioms true *a priori,* or they are indubitably given in a pure intuitive act of the mind. Thus, for example, Euclidean geometry alone is possible, and the parallel postulate is proved on the basis of a definition of parallels as lines having "the same direction." It is sufficient to say that the circularity and fallaciousness of this "proof" was pointed out by Proclus. Again, an ether is postulated, and its isotropy and homogeneity are proved by means of a vaguely formulated, but of course "indubitable," principle of causality; and the adverse experimental evidence for such an ether is explained by convenient *ad hoc* hypotheses such as the "ether drag." While Vogtherr has mastered some of the details of modern relativity physics, there is little to show in this book that he has understood what he has read.

E. N.

L'Expression de la Vie dans l'Art. CHARLES LALO. (Bibliothèque de Philosophie Contemporaine.) Paris: Félix Alcan. 1933. 263 pp.

The French are a rational people; their philosophers at least have a love for rendering chaos intelligible in schemes and formulas. In this volume the chaos of esthetics is reduced to systematic organization; one has a feeling, none the less, that the chaos remains, and the order is an order gracefully and not quite relevantly imposed on it. M. Lalo offers some useful corrective to the identification of art and life indicating that art, on many grounds imposed by beauty and by logic, "diverges from life." He has all the apparatus of learned and elegant allusion common to French critical analysis. There are excellent summaries, some malicious, of Rabelais, Bossuet, La Fontaine, Corneille, La Bruyère, down through Croce, Heidegger, and Proust. There is finally proposed an esthetic relativism, a science of "language well made" in a paragraph printed in italics as the compressed truth about esthetics:

"La beauté artistique est—un plaisir artificiel—né d'une activité de rêve libératrice—organisée comme un jeu—sous une forme harmonieuse—dont la valeur est jugée superieure et collective—tout un dynamisme déclenchant communément une puissance re-

sonante affective" (p. 236). The rest of the chapter expands and defends the formula. Some of the details of the expansion are more illuminating than the formula.

I. E.

Scienza e Filosofia. Ugo Spirito. Firenze: G. C. Sansoni. 1933. 154 pp. 12 lire.

This collection of articles is bound together by the common purpose of clarifying and defending *actualism.* Actualism identifies philosophy and something which the author calls "life." Life is not presumably the various exercises of living, but all of them fused into a kind of concrete unity which, since it seems desirable, is believed to be ideal and hence real. Philosophy, therefore, can not be of any one period or the exercise of any one group of men. It is the concrete history of all periods—the word "concrete" being understood in the Hegelian sense—and the unified expression of all interested parties. The sciences are differentiated from one another not by their subject-matters, but by "points of view," and philosophy, it would seem, takes all points of view at once. It is "not a particular form of knowledge but the universality of all knowledge" (p. 49).

The essays are particularly interesting as a picture of extreme Italian idealism, but provide more edification than enlightenment.

G. B.

Das Gesetz der Ursache. Joseph Geyser. Munich: Ernst Reinhardt. 1933. 164 pp. RM. 6.50.

The author writes a serious-minded and highly dialectical argument from a Neo-Scholastic standpoint, and answers all his critics very conscientiously. He assumes that there is a meaning to the statement: "There can be found an object *A* which is the efficient cause of any given object *B.*" He discusses the reasons for considering it true. Making a sharp distinction between essence and existence of contingent things, he lays down a sort of law of existence, that an essence continues in its state of existence or non-existence until some outside force brings about a change. He seems to feel that this involves less of an assumption than is usually contained in the principle of sufficient reason. Beyond a passing reference to Heisenberg, he hardly touches on the present scientific situation. He refers to Kant, but not to the Kantian type of argument which seeks to establish the objectivity of causality by defining objectivity in terms of causality. He appeals to inner experience, and makes wide concessions to empiricism, so long as it does not take the extreme form of the positivism of Philipp Frank. But

really most of his argument might have been written in the Middle Ages, and it is doubtful if he contributes much to the subject, from the point of view of an American reader.

H. T. C.

The Spirit of World Politics: With Special Studies of the Near East. WILLIAM ERNEST HOCKING. New York: The Macmillan Company. 1932. xi + 571 pp. $5.00.

The argument of Professor Hocking's earlier volume of political philosophy, *Man and the State,* is here carried forward into the realm of international relationships, with emphasis upon the ethical issues involved in the treatment of the so-called backward peoples by the great powers. The book is unique among treatises of political theory in that nearly two-thirds of its pages are occupied by personally-gathered illustrative material drawn from Egypt, Syria, Palestine, and Africa. Only extremists, of whom there are many, will question either the extraordinary fairness of the author's factual descriptions, or his outspoken verdicts upon the actual in the light of his high and hopeful ideals. Moralists with the audacity to risk testing their theories in the field of world-statesmanship are all too rare; and it ill becomes the closet-critics to heckle from the rear. At the same time the author's challenge to ethical relativists is too explicit to ignore; and it should be pointed out that the "essential ethical convictions" which he took with him to the Near East seem to reflect a large measure of personal preference, which may or may not possess cosmic significance. In the face of the immense difficulties, which he well understands, of making any pronouncements in international political ethics which are both realistic and coherent, Professor Hocking has produced a notable pioneer work.

H. A. L.

JOURNALS AND NEW BOOKS

RIVISTA DI FILOSOFIA. Anno XXIV, N. 4. D. Hume e il problema critico della conoscenza della filosofia moderna: *E. De Michelis.* A proposito del principio economico: *A. Levi.* Il valore della filosofia di F. H. Bradley: *C. Goretti.*

Brühlmann, Otto: Zweierlei Wissen. Zur Lebenskrise durch die Entfesselung des Verstandes. München: Ernst Reinhardt. 1934. 48s. 1.50 M.

Simpson, George: Emile Durkheim on the Division of Labor in Society. Being a translation of his *De la division du travail social,* with an estimate of his work. New York: The Macmillan Company. 1933. xliv + 439 pp. $3.50.

NOTES AND NEWS

With this number THE JOURNAL OF PHILOSOPHY is initiating a new policy regarding the publication of book reviews. Ten Book Editors, whose names appear on the inside front cover, have consented to serve as regular reviewers of incoming books. They are recognized scholars in several of our universities or colleges and represent various fields of special interest. Their reviews will be very succinct. The aim is to review promptly within a few weeks every new book of a philosophic character that reaches our office.

More extensive critical discussions of important current books or of particular issues raised in current philosophical literature will continue to be welcome and will be published as articles, in so far as the space available in the JOURNAL permits.

Another new feature of the JOURNAL is an *Annual Philosophical Bibliography*, to be published as one of the August or September numbers. The purpose of this bibliography is to keep up-to-date the Bibliography of Philosophy now being prepared under the auspices of the American Philosophical Association, covering the years 1902–1932. The annual bibliography will be included in the regular subscription price of the JOURNAL, but it will be necessary to charge $1.00 for the bibliographical number separately.

The newly-elected officers of the Eastern Division of the American Philosophical Association are the following: President, Warner Fite; Vice-President, F. S. C. Northrop; Secretary-Treasurer, Harold A. Larrabee; new members of the Executive Committee, Ralph M. Blake and Percy Hughes.

Professor Alfred North Whitehead will give the Third Annual Davies Lecture in Philosophy at the Institute of Arts and Sciences of Columbia University, March 7, 1934. The title of his lecture is "Reactions between Science and Philosophy."